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ABSTRACT

This study replicated previous research that tested the validity of A. Biglan's classification scheme, a theoretical framework for empirically examining the differences among academic disciplines and classifying them according to three dimensions (hard-soft, pure-applied, life-nonlife). In addition, new data were used to attempt continued classification of disciplines not formerly classified by Biglan. Subjects were 1,188 faculty in research and doctoral granting institutions who responded to the 1984 Carnegie Faculty Survey. Ten predictor variables were selected in four core areas: (1) faculty time use; (2) scholarly output format; (3) research funding sources; and (4) faculty attitudes. Each variable was selected on the basis of its ability to differentiate among eight mutually exclusive Biglan academic discipline clusters (soft-pure-life, soft-pure-nonlife, soft-applied-life, soft-applied-nonlife, hard-pure-life, hard-pure-nonlife, hard-applied-life, and hard-applied-nonlife). Data were analyzed using discriminate analysis procedures. Findings supported the use of the Biglan classification system as a valid conceptual framework for the study of academic disciplines. The 10 predictor variables resulted in three significant dimensions consistent with the previously reported Biglan dimensions. The new classification of previously unclassified disciplines was achieved in nursing and dentistry, but variables did not adequately classify the disciplines of medicine, social work, art, music, business, drama, physical education, and law. It was concluded that the Biglan classification scheme provides a valid framework for the study of academic diversity within the higher education system. (13 references) (LPT)

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THE BIGLAN CLASSIFICATION REVISITED

INTRODUCTION

The American professoriate is both a remarkably homogeneous group as well as one characterized by its diversity. The unifying constructs of the teaching, research and service triad bind the faculty of all institutions. The values associated with knowledge and learning, academic honesty, academic freedom and collegiality provide a cultural milieu within which faculty take part in a shared academic experience. The framework for these experiences, activities and beliefs of faculty has been described by Clark (1987) as a professorial matrix in which "niches are defined for individuals by their dual memberships in institutions and subjects." (p.42).

Upon close inspection of this matrix, the dual memberships appear to lead faculty along divergent pathways. The two major groupings of the faculty, by discipline and by institutional affiliation, have been found to distinguish faculty in attitudes, values and behaviors. Of these two groupings, disciplinary commitment seems to exert the more profound influence on the faculty member. Each discipline possesses a unique subject matter which defines the dimensions of knowledge, the modes of inquiry, the significant reference groups, and the work experiences of the faculty within them. These shared experiences create a unique disciplinary culture which rewards and reinforces the value structure of the discipline. The degree of the resultant differences among disciplines is characterized by Ladd and Lipset (1975) as extraordinary. They found greater differences of opinion among the various scholarly disciplines than among the most grossly differentiated groups in the general public.

The wide range of institutions in the higher education system however, also creates a diversifying dimension for faculty. The hierarchial arrangement of institutions preserves a system of varying emphasis on the multiple faculty roles into which faculty self-select themselves. Attitudes and values of the respective institutional cultures stratify faculty based on the emphasized role. While these institutional differences can be very influential, Bowen and Schuster (1986) agree with Ladd and Lipset in concluding that institutional differences are not as strong as disciplinary differences.

The existence of unique disciplinary attitudes, beliefs and behaviors is so obvious to some that they have characterized the faculty as academic tribes and half-humorously and half-seriously revealed the secret rituals of the tribes in rich prose (Adams, 1980). Others see the quantitative side of a diverse national group whose complexity provides enough descriptive data for more than one national study (Carnegie Foundation, 1980). One of the few conceptual approaches to the study of the diversity of the academic disciplines is the work of Biglan (1973a, 1973b). Emphasizing that the characteristics of the disciplinary subject matter may be the critical elements of the academic puzzle, he developed a classification scheme for the academic disciplines. Although a number of researchers have confirmed the validity of the classification scheme, new Carnegie data allows continued investigation of current faculty. It is the purpose of this study to replicate previous work on the validity of the classification scheme using the new data, as well as, to attempt continued classification of disciplines not formerly classified by Biglan.

BACKGROUND

Biglan (1973a) surveyed academic faculty at one large university and one small college regarding their perceptions of the similarities among academic disciplines. Analysis of the data using multidimensional scaling techniques resulted in the now well-known three dimensions of the Biglan classification. The first dimension is commonly referred to as the hard-soft dimension and reflects the degree to which the discipline may be considered to be organized around a paradigm. The second dimension is referred to as the pure-applied dimension reflecting the degree to which the discipline may be considered to have concern for the application of its body of knowledge. The concern for the study of living or organic objects is measured in the third dimension which is the life-nonlife dimension. In a subsequent study, Biglan (1973b) outlined some of the characteristics of departments and the output of their faculty using the three dimensions. The faculty in the hard disciplines were found to be more socially connected, more interested and involved in research, and to publish more often in the form of journal articles when compared with the soft disciplines. Applied scholars were more socially connected, more interested and involved in service activities and published more in the form of technical reports than their counterparts in the pure areas of study. A comparison of life and nonlife disciplines suggested that while life scholars are more socially connected, they are less interested and involved in teaching than nonlife faculty.

A number of other investigations of this classification system have shown that it can consistently discern systematic differences in the academic disciplines. Smart and Elton (1975) examined the goal orientations of academic departments as expressed by their chairmen. The hard departments placed greater emphasis on goals related to research, graduate education and development of faculty and students. Applied

departments promoted development of students, graduate programs and the provision of direct services in their goals. Life department goals included not only an interest in direct service but also focused on research and administrative efficiency. Results indicated that the differences in the departmental goals were generally consistent with the three Biglan dimensions. Further research by Smart and McLaughlin (1978) investigated the reward structures within the academic disciplines. After surveying faculty on time spent in selected categories of professional responsibilities, they attempted to predict faculty salaries. They concluded that the financial rewards associated with disciplinary responsibilities were highly variable and best predicted using eight separate regressions based on the eight disciplinary clusters of Biglan. A similar finding on the variability of faculty salaries across the Biglan academic clusters was noted in a study by Muffo and Langston (1981). In addition to salary, this study also looked at department organizational parameters such as faculty staffing and instructional workload patterns. Pure and nonlife departments were found to teach more students while hard and nonlife departments had larger faculty FTE's. An analysis of instructional ratios of students to faculty FTE's indicated that soft, pure and nonlife departments had the highest instructional ratios.

Further testing of the Biglan classification on a multi-institutional national sample was done by Creswell and Bean (1981) using the 1977 Survey of the American Professoriate by Ladd and Lipset. Focusing on research output and sources of faculty funding, they found clear distinctions among faculty outputs consistent with the Biglan dimensions. The output of scholars in the hard disciplines was most often journal articles while scholars in the soft disciplines published most in the form of books and monographs. Funding for research distinguished pure faculty who received more money

from the federal level from applied faculty who received more money from private sources. Life and nonlife faculty were also distinguished by funding sources with life disciplines receiving more state level support and nonlife receiving more federal support.

A later study on a national sample of faculty from a heterogeneous group of institutions was done by Smart and Elton (1982) to further validate the classification scheme by using a more comprehensive set of output measures than had been used in previous studies. Factor analysis of 71 variables resulted in four second-order factors (professional success, research opportunities, faculty conservatism and character development) which were able to significantly distinguish among the academic disciplines. The hard disciplines were characterized by their conservative stance on issues and their emphasis on research. Conservative attitudes were shared by applied faculty however, their time was more often spent in administrative functions. Life discipline faculty exhibited strong perceptions of professional success and satisfaction while nonlife faculty reported more interest and time in teaching activities.

These research studies contributed significantly to the development of the dimensions, however they did not continue the process of identifying the grouping of previously unclassified disciplines. One study by Malaney (1986) on differentiation in graduate education used a substantially expanded number of academic disciplines within the Biglan categories. In that study, Malaney and administrative associates devised a 12 point Biglan scale and categorized 114 graduate academic degree programs at a large public research university. When they compared their classification results for the 33 Biglan disciplines which they had in common with the original Biglan classification, they found they had a 96% level of agreement. Eighty-one new department classifications resulted from that study.

This accumulating literature suggests that the Biglan classification system contributes to the recognition of the unique characteristics of academic discipline clusters. It indicates that those disciplinary characteristics may drive the organization and work patterns of the respective departments, as well as reveal a profile of the faculty within them. The present study will build on this literature by utilizing variables gleaned from the previous research to study faculty from the most current available national survey and further classify previously unclassified academic disciplines.

METHOD

Variables

The variables for this study focused on four areas: 1) faculty time use, 2) the format of faculty scholarly output, 3) the source of research funding, and 4) the attitudes of the faculty. Each variable was selected by the investigator on the basis of its conceptual ability to distinguish faculty as well as on the basis of its tested ability to distinguish faculty as reported in the literature.

The first set of variables was related to the manner in which faculty allocate their time. The use of time by faculty has been found to vary by discipline cluster (Biglan, 1973b; Smart and Elton, 1982). Faculty in the hard subject matter areas tend to have higher interest in research and devote more time to doing research than faculty in the soft areas. Preference for teaching and the amount of time spent teaching predominates in the soft subject matter areas, as it does in the nonlife areas when compared to the life areas. Faculty in applied disciplines prefer service activities and devote more time to them. The second set of variables concerns the type of scholarly output of the faculty. Each academic discipline varies in the format of its published works (Biglan, 1973b;

Creswell and Bean, 1981). Those faculty in the hard disciplines produce more journal articles while those in the soft disciplines produce more monographs. Applied disciplines tend to use more technical documents to report their work. The sources of the funding for scholarly work constitute the third set of variables. A variety of sources provide funding for scholarly works. Each funding source seems to have a propensity to fund within a specific discipline cluster (Creswell and Bean, 1981). Federal dollars flow to the faculty in the pure fields of study while state and local funds are distributed to faculty in the life oriented areas. Private industry money is more likely to be obtained by those in the applied fields. The last set of variables is related to faculty attitudes. While attitudes vary widely on a number of academic dimensions (Ladd and Lipset, 1975), they also vary specifically by discipline cluster (Smart and Elton, 1982). The most conservative ideas are shared by both applied and hard disciplines. The application of disciplinary knowledge evokes debate in the applied fields while ideas on what is good scholarship are often quite uniform in the high paradigm, hard disciplines. Full definitions of all variables are given in Table I.

TABLE I

VARIABLE NAME		VARIABLE DEFINITION
Faculty Time Use:		
1.	Research Time	The amount of time the faculty member spends in research in hours per week.
2.	Teaching Time	The amount of time the faculty member spends in teaching activities in hours per week. Includes instruction and preparation.
3.	Consulting Time	The amount of time the faculty member spends in consulting in hours per week.
Type of Faculty Scholarly Output:		
4.	Monographs	The number of books or monographs published by the faculty member.
The Source of Funding for Research:		
5.	Private Level	Source of funding in the last 12 months was from the private sector. Yes-No
6.	State Level	Source of funding in the last 12 months was from the state level. Yes-No
7.	Federal Level	Source of funding in the last 12 months was from the federal level. Yes-No
Faculty Attitudes:		
8.	Conservative View	Faculty response to the question, How would you characterize yourself politically? Coded 1-5 Left to Strongly Conservative
9.	Attitude toward Scholarship	Combined faculty response to statements A and B. A. The faculty in my department have fundamental differences about the nature of the discipline. Coded 1-4 Agree to Disagree B. In my field, most people agree on the standards of good scholarship. Recoded 1-4 Disagree to Agree.
10.	Attitude toward Application	Combined faculty response to statements A and B. A. The goal of an academic scholar is to advance knowledge without regard for the possible implications for society. Coded 1-4 Agree to Disagree. B. Government research funds should be allocated to universities on the basis of the need to solve significant social problems. Recoded 1-4 Disagree to Agree.

Subjects

The subjects for this analysis were 5057 respondents to the 1984 Carnegie Faculty Survey. Only those faculty in research and doctoral granting institutions were selected in order to minimize possible institutionally-based discipline misclassification problems which have been noted by Muffo and Langston (1981) as a potential error source. The final sample was 1188 faculty.

Analysis

The data analysis was done by discriminate analysis procedures. Discriminate analysis allows for both interpretation of the manner in which groups differ as well as the classification of previously ungrouped cases (Klecka, 1980). The first component of this analysis is the interpretive function. The purpose was to replicate the validity of the three dimensions of the Biglan classification using the selected "discriminating" predictor variables. Ten predictor variables were selected in four core areas: 1) faculty time (research time, teaching time, consulting time), 2) scholarly output format (number of monographs), 3) funding sources (federal, state, private), 4) attitudes, (conservative view, scholarship view, application view) (See Table I). The ten predictor variables were assumed to maximize the differences among the mutually exclusive Biglan academic discipline clusters. The eight Biglan clusters were used as follows: soft-pure-life (SPL), soft-pure-nonlife (SPNL), soft-applied-life (SAL), soft-applied-nonlife (SANL), hard-pure-life (HPL), hard-pure-nonlife (HPNL), hard-applied-life (HAL), hard-applied-nonlife (HANL).

The second component of this analysis is the classification function of the discriminate analysis procedure. After the predictor variables were found to be capable of distinguishing the Biglan groups effectively, previously unclassified disciplines were selected. The five professional disciplines were Medicine, Dentistry, Nursing, Social Work, and Law. The five traditional disciplines were Business, Art, Drama, Music, and Physical Education. Each traditional discipline had at least 100 in the overall sample in the Carnegie study. All ten disciplines were individually classified.

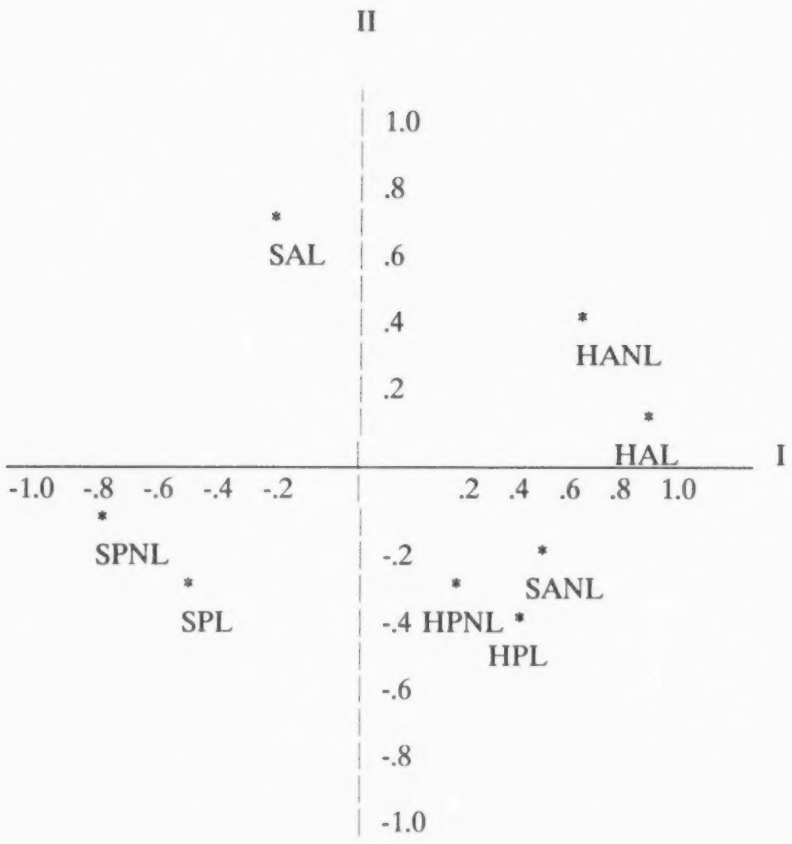
RESULTS

Part 1:

The discriminant analysis resulted in four significant discriminant functions. The first three accounted for 51.94, 28.87 and 10.51 percentages of the variance and were considered to be important. Table II presents the standardized discriminant function coefficients for the predictor variables on the three significant functions. Figures 1 and 2 illustrate the plotting of the group centroids for the three significant functions.

TABLE II

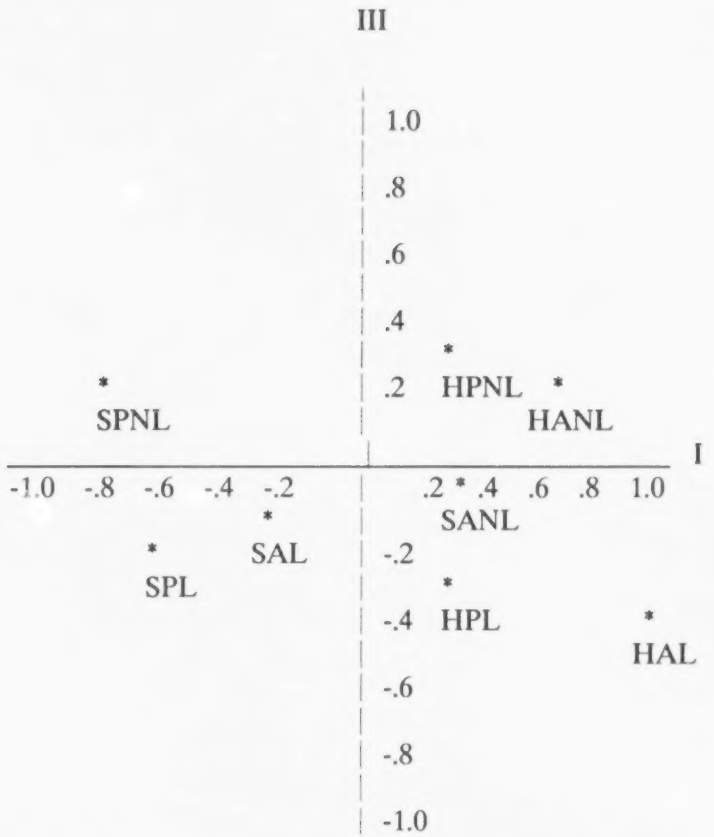
VARIABLE		STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS		
	Name	Function I	Function II	Function III
Time Use:				
1.	Research Time	.435	- .525	- .245
2.	Teaching Time	- .228	.189	.513
3.	Consulting Time	.249	.309	- .351
Scholarly Output:				
4.	Monographs	- .353	.094	- .035
Funding Source:				
5.	Private	- .012	.237	- .033
6.	State	.096	.041	.347
7.	Federal	.239	- .153	- .345
Attitudes:				
8.	Conservative View	.711	.462	- .009
9.	Attitude toward Scholarship	.259	- .103	.636
10.	Attitude toward Application	- .175	.455	- .326



HPL = hard-pure-life
HPNL = hard-pure-nonlife
HAL = hard-applied-life
HANL = hard-applied-nonlife

SPL = soft-pure-life
SPNL = soft-pure-nonlife
SAL = soft-applied-life
SANL = soft-applied-nonlife

Figure 1. Centroids of the Eight Biglan Discipline Clusters on Discriminant Function I and II.



HPL = hard-pure-life
HPNL = hard-pure-nonlife
HAL = hard-applied-life
HANL = hard-applied-nonlife

SPL = soft-pure-life
SPNL = soft-pure-nonlife
SAL = soft-applied-life
SANL = soft-applied-nonlife

Figure 2. Centroids of the Eight Biglan Discipline Clusters on Discriminant Function I and III.

The first function appears to discriminate between the hard disciplinary groups and the soft groups. The function is dominated by the large coefficient for faculty attitudes which are conservative in nature. Also important in this function are the large positive coefficients for the amount of time spent in research, the attitude toward scholarship and the federal funding source. The location of all four group centroids for the hard disciplinary cluster is on the positive side of this function (Figure 1, horizontal axis). This distribution would suggest that the faculty in the hard disciplines are a politically conservative group who share similar views on parameters for good scholarship in their field. Their academic life is spent largely in research activities for which they depend heavily on the federal government as a source of funding. Three of the four group centroids for the soft disciplines are located on the negative side of this function indicating a reversed pattern of scores.

The second function appears to discriminate between the pure and applied disciplinary groups. The nature of this function is defined by the large coefficients for attitudes which are conservative and attitudes which are positive toward the application of knowledge. The function also exhibits large positive coefficients for private funding sources and spending time in consultative roles. The location of the group centroids of three of the four applied disciplinary groups on the positive side of this function (Figure 1, vertical axis) indicates that these disciplines exhibit high levels of these predictor variables. The applied disciplines are largely conservative, seeing the need for the application of their scholarly work, spending their time promoting that application through their consultative role and being supported by their private beneficiaries. This

picture of the applied disciplines is highly consistent with our current knowledge. The group centroids for the pure disciplines were all on the negative end of the function indicating low scores on the predictor variables.

The third function appears to discriminate between the life and nonlife disciplinary clusters. The nature of this function is defined by large positive coefficients for a unified paradigmatic view of good scholarship, large amounts of time spent in teaching, and the state source of research funding. The location of the group centroids for three of the four nonlife disciplines is on the positive side of this function (Figure 2, vertical axis). All four nonlife disciplines are more positive than all the life disciplines. This distribution suggests that members of the nonlife disciplines have a uniform view of good scholarship, spend most of their work time in the teaching function and receive most of their research funding from state level sources. The life disciplines were all on the negative end of this function indicating low scores on the predictor variables.

Part 2:

The classification of the professional disciplines resulted in no clear patterns of distribution. The analysis was able to classify two disciplines with at least 50% of the predicted group membership in one Biglan cluster. Of the Nursing group, 54.21% (N=48) was classified as in the soft-applied-life disciplinary cluster. Fifty percent of the Dentistry group (N=10) was classified as in the hard-applied-nonlife group. The remaining professional groups had no more than 30% classified in any one disciplinary group but did have majorities in the following combinations. Fifty percent of the

Medicine group (N=92) was distributed in the hard categories. Of the 50%, the largest single group, 21.7% was in the hard-applied-life category. Seventy-five percent of the Social Work group (N=12) was distributed in the soft categories with the largest single group, 25%, in the soft-pure-nonlife group. Eighty-three percent of the Law group (N=18) was in the soft categories. The soft-applied-nonlife disciplinary cluster contained the largest single percentage group, 27.8% of the law group.

The traditional disciplinary groups classified exhibited large percentages of cases in one disciplinary cluster in two disciplines. Thirty-two percent of the Art group (N=25) was classified as hard-pure-nonlife and 35% of the Physical Education group (N=20) was classified in the soft-pure-nonlife cluster. Fifty-seven percent of the Music group (N=57) was split between the soft-applied-life cluster and the soft-pure-nonlife cluster as was 53% of the Drama group (N=33). The Business/management group (N=80) had 56.4% classified in the soft categories with the largest single group, 27.5%, in the soft-applied-life cluster.

DISCUSSION

The findings of this study support the continued use of the Biglan classification system as a valid conceptual framework for the study of the academic disciplines. The ten selected discriminating variables when used to differentiate the academic disciplines resulted in three significant dimensions consistent with the previously reported Biglan dimensions. The manner in which faculty spend time, the type of scholarly output generated, the type of funding sources used, and the attitudes of the individuals

themselves were found to discriminate faculty groups such that three significant functions resulted. The first function, defined by conservative political views, a unified view of scholarly research, academic activity dominated by research and funding from the federal government, differentiated the hard and soft disciplinary clusters. The second function, defined by conservative views, concern with knowledge application, activity largely related to consulting, and funding from private sources, clearly split the pure and applied academic disciplines. The third function, defined by uniform views of good scholarship, activity dominated by teaching and funding sources at the state level differentiated the life and nonlife disciplinary groups. This clear replication of the three dimensions with a current nationally representative faculty sample is consistent with the findings of the previous research on the dimensions of the Biglan classification system (ie., Biglan, 1973b; Creswell & Bean, 1981; Smart & Elton, 1982).

The new classification of previously unclassified disciplines in which a majority of the members were classified in one academic disciplinary cluster was achieved in only two disciplines. Nursing was classified in the soft-applied-life cluster which is in agreement with the Malaney classification. A study of professional faculty roles (Stark, 1986) in which Nursing faculty were found to spend large amounts of time in the teaching role and minimal time in the research function supports this classification. Dentistry was found to be hard-applied-nonlife in contrast to the hard-applied-life categorization by Malaney. For the other six disciplines which are also classified by Malaney, this study shows only a few similarities in classification. Both studies found Medicine to be a hard discipline and Social Work to be distributed in the soft categories.

The classification of Art in the nonlife group, Music in the soft-nonlife group and Business in the soft-applied group was consistent in both studies.

The lack of clear results and uniformity of classification may be due in part to the very small numbers in certain disciplines within this study. Differences in coding procedures between this and the Malaney study may also be a source of error. Further study with larger disciplinary groups may be able to refine the categorization of previously unclassified academic disciplines.

CONCLUSION

The Biglan classification scheme provides a valid framework for the study of academic diversity within the higher education system. It continues to be a strong construct for classification of faculty as evidenced by its power to discriminate current faculty on a recent faculty data set. Previously unclassified professional disciplines of Dentistry and Nursing were classified as hard-applied-nonlife and soft-applied-life respectively.

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